MISSOURI OIL AND GAS COUNCIL

Form OGC - 3

APPLICATION FOR PERMIT TO DRILL, DEEPEN OR PLUG BACK

APPLICATION TO DRILL ☑ DEEPEN ☐ PLUG BACK ☐

NAME OF COMPANY OR OPERATOR DNR - Geol Survey DATE Sept 77

Box 250 (Address) Rolla (City) Mo (State)

DESCRIPTION OF WELL AND LEASE

Name of lease	Well number	Elevation (ground)
ERDA - TS	37	873

WELL LOCATION (give footage from section lines)

132 ft. from (N) (S) sec. line 7 ft. from (E) (W) sec. line

WELL LOCATION Section 16 Township 33N Range 32W County Barton

Nearest distance from proposed location to property or lease line: _____ feet

Distance from proposed location to nearest drilling, completed or applied – for well on the same lease: NA feet

Proposed depth:	Rotary or Cable tools	Approx. date work will start
175	Rotary (Air)	

Number of acres in lease: NA

Number of wells on lease, including this well, completed in or drilling to this reservoir: _____

Number of abandoned wells on lease: _____

If lease, purchased with one or more wells drilled, from whom purchased: Name NA Address _____

No. of Wells: producing _____ inactive _____ abandoned _____

Status of Bond

Single Well ☐ Amt. _____ Blanket Bond ☐ Amt. NA ☐ ON FILE ☐ ATTACHED

Remarks: (If this is an application to deepen or plug back, briefly describe work to be done, giving present producing zone and expected new producing zone) use back of form if needed.

Strat Test

Proposed casing program: amt.	size	wt./ft.	cem.	Approved casing – To be filled in by State Geologist amt.	size	wt./ft.	cem.
		None					

I, the undersigned, state that I am the _____ of the _____ (company), and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

Signature _____

Permit Number: 20029

Approval Date: Sept 1977

Approved By: Wallace B Howe

☑ SAMPLES REQUIRED

☐ SAMPLES NOT REQUIRED

WATER SAMPLES REQUIRED @: _____

Note: This Permit not transferable to any other person or to any other location.

Remit two copies to: Missouri Oil and Gas Council P.O. Box 250 Rolla, Mo. 65401

One will be returned.

Approval of this permit by the Oil and Gas Council does not constitute endorsement of the geologic merits of the proposed well nor endorsement of the qualifications of the permittee.

MISSOURI OIL AND GAS COUNCIL

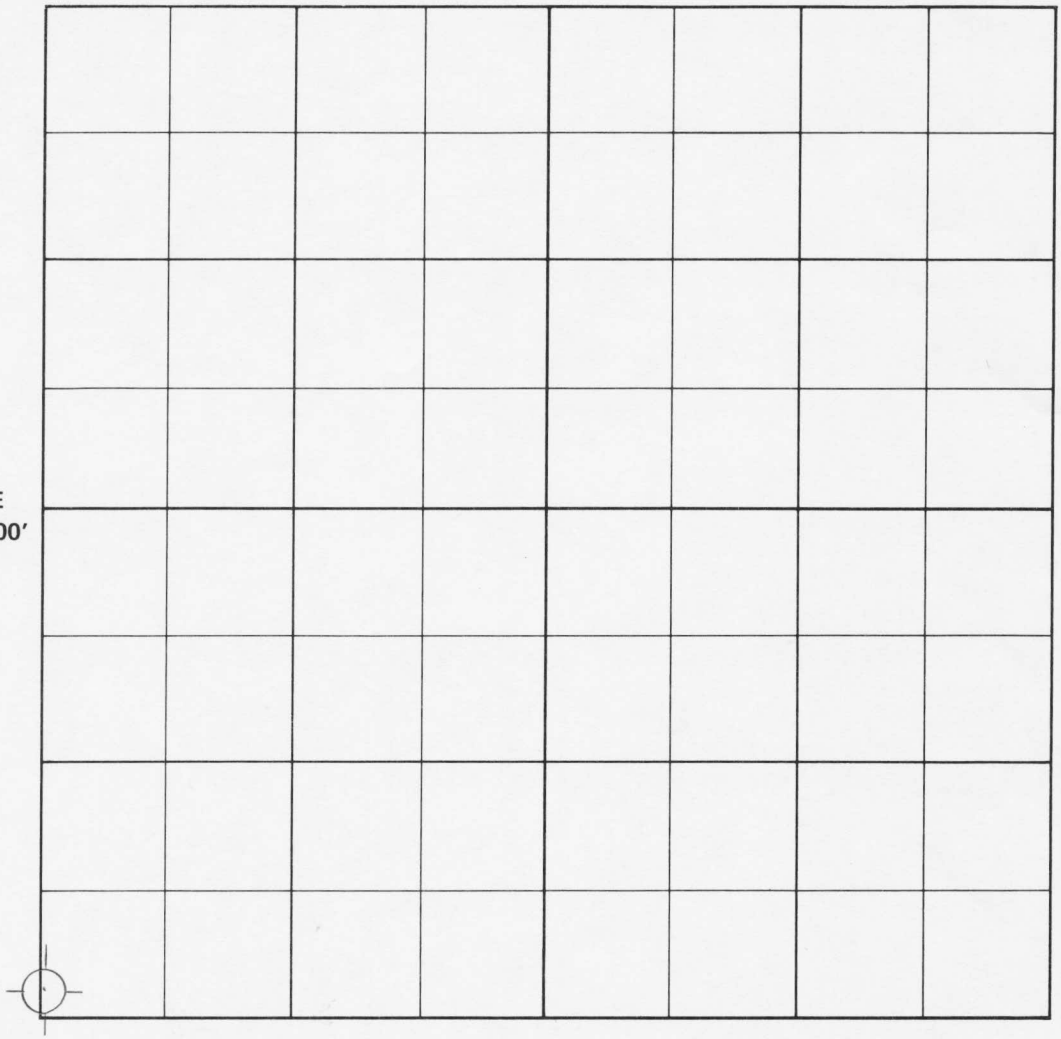
Form OGC - 4

WELL LOCATION PLAT

Owner: DNR - Geol Survey

Lease Name: ERDA-TS NO. 37 County, Barton

132 feet from (N) - (S) line and 7 feet from (E) - (W) line of Sec. 16 Twp. 33N Range 32W



SCALE
1" = 1000'

REMARKS: _____

INSTRUCTIONS

On the above plat, show distance of the proposed well from the two nearest lease and section lines, and from the nearest well on the same lease completed in or drilling to the same reservoir. If the location requested is not in conformance with the applicable well-spacing rules, show all off-setting wells to the proposed well. Do not confuse survey lines with lease lines. See rule 7 - 3 (b) for survey requirements.

(SEAL)

Remit two copies to: Missouri Oil and Gas Council
P.O. Box 250 Rolla, Mo. 65401
One will be returned.

_____
Registered Land Surveyor

TEST BORING LOG

Project E. R. D. A. Boring No. 37 Sheet 1 of 3

Sec. 16, T. 33N., R. 32W. Surface Elevation 873' Offset

Address Date Started 9/30/77 Completed

City & State Driller Rig

Abbreviations: A.O. – Auger Only R.B. – Rock Bit C.W. – Core Water
H.A. – Hollow Auger S.S. – Split Spoon C.A. – Core Air
W.B. – Wash Bore S.T. – Shelby Tube F.B. – Finger Bit

DEPTH FROM	DEPTH TO	METHOD	PENETRATION RECORD: POCKET PENETRO-METER	PENETRATION RECORD: NO. OF BLOWS	CORE RECOVERY	SAMPLE DESCRIPTION: COLOR–MATERIAL–MOISTURE–CLAY CONSISTENCY SAND DENSITY
0.0'	1.0'	WB				Topsoil
1.0'	5.0'	WB				Brown silty clay
5.0'	10.0'	WB				Gray weathered shale
10.0'	20.0'	CW1			10.0'	Dark gray shale, w/sand seams, hard 25 pcs. .05 to 1.2
20.0'	27.0'	CW2			6.0'	Same 20 pcs. Broken to 0.7
27.0'	30.0'	CW2			2.5 1.5'	Gray siltstone Gray sandstone w/oil 9 pcs.
30.0'	33.7'	CW3			2.7'	Same 2 pcs. 1.0 to 1.7
33.7'	35.0'	CW3			1.3'	Light gray shaly sandstone 8 pcs. .05 to 0.5
35.0'	40.0'	CW3			6.0'	Gray shale, med. hard 16 pcs. Broken to 0.6
40.0'	45.0'	CW4			5.0'	Same 6 pcs. 0.1 to 1.3
45.0'	46.0'	CW4			1.0'	Light gray shale, med. hard 2 pcs. 0.2 to 0.8
46.0'	47.0'	CW4			1.0'	Light gray siltstone w/some oil 1 piece
47.0'	50.0'	CW4			3.0'	Gray sandstone trace bleeding oil 4pcs. 0.6 to 1.3
50.0'	56.1'	CW4			6.1'	Gray sandstone 7 pcs. 0.3 to 1.7
56.1'	59.4'	CW5			3.3'	Gray shale, hard 9 pcs. .05 to 0.5
59.4'	60.0'	CW5			0.6'	Gray siltstone, 4 pcs. 0.1 to 0.2

REMARKS: (Casing, Water Loss, Etc.) Water Level Time Date

(Completion)

Layne-Western Company, Inc. 1010 WEST 39th STREET, KANSAS CITY, MISSOURI 64111

TEST BORING LOG

Project E. R. D. A. Boring No. 37 Sheet 2 of 3

Surface Elevation _____ Offset _____

Address _____ Date Started _____ Completed _____

City & State _____ Driller _____ Rig _____

Abbreviations: A.O. – Auger Only; H.A. – Hollow Auger; W.B. – Wash Bore; R.B. – Rock Bit; S.S. – Split Spoon; S.T. – Shelby Tube; C.W. – Core Water; C.A. – Core Air; F.B. – Finger Bit

DEPTH FROM	DEPTH TO	METHOD	PENETRATION RECORD: POCKET PENETRO-METER	PENETRATION RECORD: NO. OF BLOWS	CORE RECOVERY	SAMPLE DESCRIPTION: COLOR–MATERIAL–MOISTURE–CLAY CONSISTENCY SAND DENSITY
60.0'	61.6'	CW6			1.6'	Gray sandstone, 3 pcs. 0.2 to 1.0
61.6'	65.5'	CW6			3.9'	Gray shaly siltstone 18 pcs. 0.1 to 1.0
65.5'	70.0'	CW6			4.5'	Dark gray shale, 11 pcs. 0.1 to 1.6
70.0'	70.9'	CW6			0.9'	Same 2 pcs.
70.9'	80.0'	CW6			9.1'	Light gray sandy shale, broken to 0.5 42 pcs.
80.0'	82.5'	CW7			2.5'	Same 12 pcs. .05 to 0.6
82.5'	90.0'	CW7			7.5'	Gray sandstone w/shale seams 45 pcs. Broken 0.
90.0'	96.4'	CW8			6.4'	Same 43 pcs. Broken to 0.2
96.4'	97.0'	CW8			0.6'	Gray siltstone 1 piece
97.0'	100.0'	CW8			3.0'	Gray sandstone w/shale seams Broken to 0.2
100.0'	109.0'	CW9			9.0'	Same 66 pcs. Broken to 0.4
109.0'	110.0'	CW9			1.0'	Gray siltstone, 2 pieces
110.0'	120.0'	CW10			10.0'	Same 28 pieces .05 to 1.3
120.0'	130.0'	CW11			10.0'	Gray sandstone 16 pieces 0.4 to 2.1
130.0'	134.9'	CW12			4.9'	Same 7 pieces 0.3 to 1.6
134.9'	136.3'	CW12			1.4'	Black coal, 11 pcs. Broken to 0.6

REMARKS: (Casing, Water Loss, Etc.) Water Level Time Date

_____ _____ _____ _____ (Completion)

_____ _____ _____ _____

Layne-Western Company, Inc. 1010 WEST 39th STREET, KANSAS CITY, MISSOURI 64111

TEST BORING LOG

Project E. R. D. A. Boring No. 37 Sheet 3 of 3

Surface Elevation _____ Offset _____

Address _____ Date Started _____ Completed _____

City & State _____ Driller _____ Rig _____

Abbreviations: A.O. – Auger Only; H.A. – Hollow Auger; W.B. – Wash Bore; R.B. – Rock Bit; S.S. – Split Spoon; S.T. – Shelby Tube; C.W. – Core Water; C.A. – Core Air; F.B. – Finger Bit

DEPTH FROM	DEPTH TO	METHOD	PENETRATION RECORD: POCKET PENETROMETER	PENETRATION RECORD: NO. OF BLOWS	CORE RECOVERY	SAMPLE DESCRIPTION: COLOR–MATERIAL–MOISTURE–CLAY CONSISTENCY SAND DENSITY
136.3'	140.0'	CW12			3.7'	Gray shale w/sand seams 18 pieces
140.0'	150.0'	CW13			10.0'	Same 30 pieces
150.0'	159.0'	CW14			9.0'	Same 28 pieces
159.0'	160.0'	CW14			1.0'	Black coal, 4 pieces
160.0'	160.9'	CW15			0.9'	Same 3 pieces
160.9'	163.3'	CW16			2.4'	Black shale, 3 pieces
163.3'	170.0'	CW16			6.7'	Light gray limestone w/chert 10 pcs.
170.0'	171.0'	CW17			1.0'	Same 4 pieces
171.0'	Total	depth				

REMARKS: (Casing, Water Loss, Etc.) Water Level Time Date

_____ _____ _____ _____ (Completion)

_____ _____ _____ _____

Layne-Western Company, Inc. 1010 WEST 39th STREET, KANSAS CITY, MISSOURI 64111

LW-59A

QUADRANGLE: Liberal

ERDA T.S. Core No. 37
COUNTY: Barton

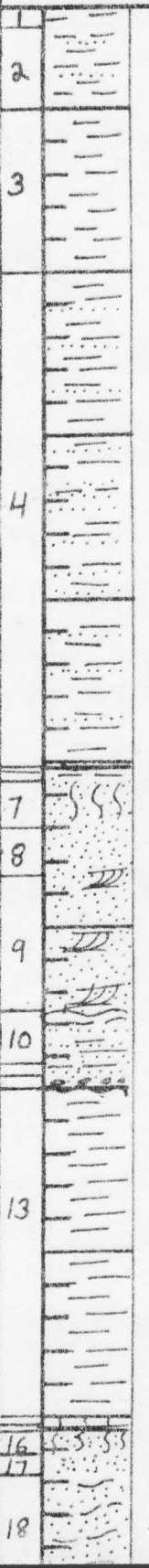
LOCATION: SW1/4 SW1/4 SW1/4 SEC. 16 T.33N. R.32W.
132 FSL; 7 FWL

DATE: LOGGED October 9 & 1977

LOCATION DESCRIPTION: 2-1/2 miles south and 2-1/2 miles west of Liberal

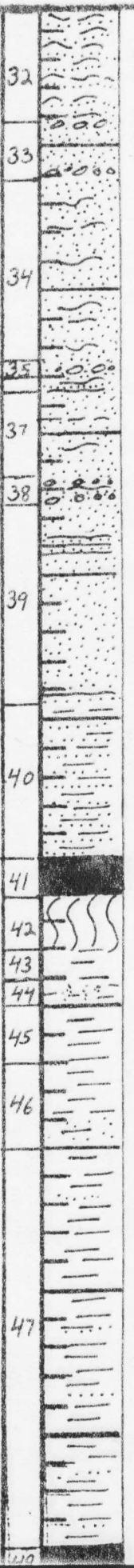
elevation 880.0 topo. map

DEPTH FROM	DEPTH TO	BED NO.	LITHOLOGY
0.0	1.0	1	soil, brown
1.0	5.0	2	clay, yellow brown, silty
5.0	10.0	3	shale, dk. gray, weathered Rock chip samples to 10.0 ft.
10.0	25.1	4	shale, med. gray with paper thin lenses of lt. gray ss.; increased ss. content at middle; non calc. tan sandy ironstone zones at 14.5-14.7 ft and 16.0-16.3 ft.
25.1	25.12	5	coal, bright, fractured into pieces
25.12	25.3	6	shale, dk. gray, fractured into pieces
25.3	27.0	7	ss., lt. gray, argillaceous, carbonized roots
27.0	28.4	8	ss, lt. gray, argillaceous, sand sized siderite concretions, micaceous, bioturbite structures
28.4	32.7	9	ss., fine grained, cross-bedded, dk. brown to black, oil stained, saturated from 30.6-32.7 ft
32.7	34.2	10	ss, stained brown with asphalt, cross laminated ripples interlaminated with equal amounts of greenish gray sandy non asphaltic clay; sharp contact with overlying unit
34.2	34.6	11	shale, greenish gray, sandy
34.6	35.0	12	ss, small scale cross bedding, sand sized siderite concretions; conglomeratic from 34.85-34.95 with granule size clasts of coal and dk. gray shale; sharp wavy contact with underlying unit
35.0	45.0	13	shale, dk. gray, non calc.; bits pyritized wood, non calc., tan clay-ironstone zones at 38.7-38.8
45.0	45.2	14	ls., dk gray, hard, fossiliferous with small chonetid brachiopods and spines of productids
45.2	45.21	15	coal, bright
45.21	46.2	16	underclay, very sandy; carbonized roots; sand sized siderite concretions
46.2	46.8	17	ss., med. gray, argillaceous, bioturbite appearance



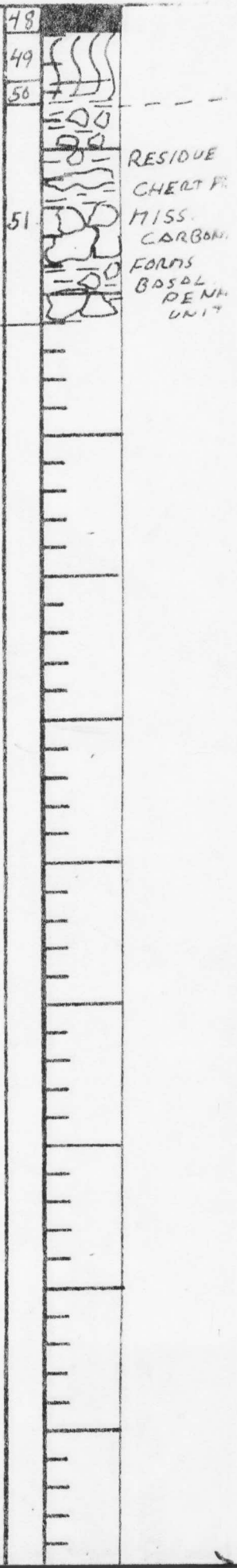
46.8	52.0	18	ss., ripple cross laminations to cross bedded, stained with dk. brown to black asphalt, intercalated with lt. gray argillaceous, non asphaltic clay lenses which comprise approx. 40% of unit (clayey lenses impermeable to asphaltic penetration)
52.0	56.1	19	ss., homogenous; dk gray, salt and pepper appearance with sand sized specks of gilsonite
56.1	56.6	20	shale, dk gray; flora of Cordaites leaves, fern stems, stringers of bright coal; fractured into pieces
56.6	57.4	21	underclay, lt greenish gray, carbonized roots, sandy
57.4	59.4	22	shale, greenish gray; abundant sand-sized siderite concretions in top 1 ft.; becoming sandy at bottom with quartzose ss.
59.4	61.6	23	ss, cross-bedded, med gray, bits of gilsonite and/or coal, very micaceous
61.6	65.5	24	ss., lt. gray wavy laminae (ripples), intercalated with dk gray shale laminae, units paper thin to .01 ft. thick
65.5	67.6	25	shale, black, pyritized worm trails and twigs
67.6	70.9	26	ss., dk. gray with lt. gray swirls and pods of ss. (bioturbite structure)
70.9	72.0	27	underclay, lt. greenish gray, carbonized roots; sharp irregular contact with overlying unit
72.0	73.8	28	claystone, greenish gray, silty; abundant sand-sized siderite concretions
73.8	82.4	29	ss., lt. gray (ripple, cross laminated) intercalated with med. gray shale; units lenticular to .02 ft. thick
82.4	96.4	30	ss., lt gray, lenticular ripple laminated, intercalated with med. gray shale containing bits coaly material and caramel colored spore sacks, micaceous (color from GSA rock color chart N8 light gray and N5 med gray); predom. ss. 92.5-92.9 ft speckled black with bits gilsonite or coaly material, conglomeratic near bottom with few elongated clasts of tan clay or plant material
96.4	97.2	31	ss., lt gray, fine to med grained (1/8 to 1/4 mm dia) angular to rounded grains, quartzose; to .03 ft. thick gray and brown shale beds in places broken and disoriented to form conglomeratic ss; flat elongated clasts
97.2	109.2	32	ss., lt. gray and dk. gray wavy shale (N3 dry) intercalated, units paper thin to .05 ft thick; ss. bed 97.7-98.4 ft

109.2	111.1	33	ss, lt. gray, fine grained conglomeratic especially in top and bottom .3 ft., granule-size to .05 ft. dia. clasts of dk. gray shale, tan woody material, coal, bladelike to spherical clasts; few paper thin laminae consisting of bits of fusain, mica
111.1	117.5	34	ss., lt. gray, contorted structures 111.4-111.8 ft. otherwise evenly bedded with approx. 30% of unit med. gray shale laminae and paper thin wavy coal laminae, micaceous, pyritiferous, non calc.
117.5	118.0	35	conglomerate, spherical to bladelike clasts to .03 ft. dia. of tan woody material, clay ironstone, coal; lt. gray fine to med. grained ss. matrix
118.0	118.5	36	ss, lt. gray and coal interlaminated in equal amounts, few pieces brown woody material, micaceous
118.5	121.6	37	ss., lt. gray, fine grained, non calc., few paper-thin laminae consisting of randomly oriented bits coal or charcoal
121.6	122.5	38	conglomerate, predom. oblong-shaped to lenticular clasts of tan (dk. yellowish brown 10YR 4/2 GSA Rock Color Chart) imbricate to randomly oriented to .05 ft. dia.; lt. gray fine grained ss. matrix; predom. ss. lt. gray interlaminated with coal from 121.9-122.3 ft., micaceous
122.5	129.5	39	ss., lt. gray fine grained, micaceous, med gray shale interlaminated with lt. gray ss. 123.7-124.4 ft; .1 ft thick bed coal at 129.2 ft. (coalified twig)
129.5	134.9	40	ss., lt. gray, ripples and med gray shale interlaminated in equal amounts
134.9	136.2	41	coal, shiny, pieces of fusain common; cleats filled with calcite; 1 or 2% of unit is nodules and lenses pyrite
136.2	138.0	42	underclay dk. gray at top to med. gray at bottom, root impressions
138.0	139.0	43	claystone, med. gray, sand-sized concretions of siderite and nodules pyrite
139.0	140.0	44	shale, med. gray, lenses and pods of lt. gray ss. bioturbite structures
140.0	142.0	45	shale, med. gray, grades downsection into greenish gray shale
142.0	145.0	46	shale, greenish gray, clay ironstone bed 143.9-144.2 ft.; sandy at bottom
145.0	159.0	47	shale, dk. gray (dry, black wet) 1 or 2% of unit is lt. gray ss., lenses (paper-thin) dispersed throughout; non calc.
159.0	160.9	48	coal, bright bands (vitrain) to dull bands (fusain); lenses of pyrite to .01 ft thick



160.9	162.4	49	underclay, dk. gray, slickensided, carbonized roots
162.4	163.4	50	shale, black, non calc
163.4	171.0	51	breccia, lt. gray to white dense chert clasts, granule size to .3 ft thick; approx. 40% of unit is clay matrix (black 163.4-163.6 ft, tan 163.4-165.4 ft. and predom. green to bottom of hole); lost core 167.5-168.5

T. D. 171.0 ft.



OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

April 12, 1978

Missouri Department
of Natural Resources
P.O. Box 250
Rolla, Missouri 65401

Gentlemen:

Attached hereto are the results of tests run on the rotary core samples taken from the ERDA-TS Lease, Well No. 37, Barton County, Missouri, and submitted to our laboratory on February 23, 1978.

These core samples were sampled by a representative of the client.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP:cb
5 c to Rolla, Missouri

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Missouri Department of Natural Resources Lease ERDA-TS Well No. 37

Location 132' FSL & 7' FWL

Section 16 Twp. 33N Rge. 32W County Barton State Missouri

Name of Sand	
Top of Core	29.0
Bottom of Core	56.0
Top of Sand	29.0
Bottom of Sand	56.0
Total Feet of Permeable Sand	7.0
Total Feet of Floodable Sand	

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 – 25	4.0	4.0
25 & Above	3.0	7.0

Average Permeability Millidarcys	42.5
Average Percent Porosity	20.1
Average Percent Oil Saturation	40.3
Average Percent Water Saturation	35.3
Average Oil Content, Bbls./A. Ft.	658.
Total Oil Content, Bbls./Acre	4,604.
Average Percent Oil Recovery by Laboratory Flooding Tests	
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	
Total Calculated Oil Recovery, Bbls./Acre	
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F (Reported)	19.
Elevation, Feet (Ground Level)	873.

OILFIELD RESEARCH LABORATORIES

- LOG -

Company Missouri Department of Natural Resources Lease ERDA-TS Well No. 37

Depth Interal, Feet	Description of Samples Only
29.0 - 31.0	Brown sandstone.
32.0 - 33.0	Brown sandstone.
49.0 - 50.0	Light brown sandstone.
52.0 - 54.0	Grayish light brown sandstone.
55.0 - 56.0	Grayish light brown shaly sandstone.

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Missouri Department of Natural Resources Lease ERDA-TS Well No. 37

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	29.7	19.4	67	9	76	1,009	9.4	1.0	1.0	1,009	9.40
2	30.7	22.5	68	9	77	1,187	110.	1.0	2.0	1,187	110.00
3	32.3	22.9	74	3	77	1,318	20.	1.0	3.0	1,318	20.00
4	49.2	19.9	26	41	67	401	45.	1.0	4.0	401	45.00
5	52.1	15.7	12	69	81	146	2.3	1.0	5.0	146	2.30
6	53.4	19.8	15	69	84	230	101.	1.0	6.0	230	101.00
7	55.15	20.2	20	47	67	313	10.	1.0	7.0	313	10.00